Responses to Restriction Requirement and Species Restriction

ELECTION OF THE CLAIMS

In response to the outstanding Restriction Requirement, Applicants hereby elect the claims of Group I, i.e., claims 1-14, drawn to a first process for the production of acetic acid, without traverse.

SPECIES ELECTIONS

(A) In response to the requirement to elect one (1) genus of anaerobic acetogenic bacteria, Applicants provisionally elect *Clostridium* bacteria.

(B) In response to the requirement to elect one (1) gas, Applicants provisionally elect a gas comprising carbon monoxide, carbon dioxide, and hydrogen.

AMENDMENTS TO THE SPECIFICATION

Kindly amend the title of the application as follows:

~~IMPROVED~~ MICROBIAL PROCESS FOR THE PREPARATION OF ACETIC ACID, AS WELL AS SOLVENT FOR ITS EXTRACTION FROM THE FERMENTATION BROTH ~~AND IMPROVED SOLVENTS USEFUL IN THE CONVERSION OF GASES INTO USEFUL PRODUCTS~~

AMENDMENTS TO THE CLAIMS

1(Currently Amended). An anaerobic microbial fermentation process for the production of acetic acid, said process comprising the steps of:

(a) fermenting in a bioreactor ~~an aqueous stream comprising a nutrient mixture with an anerobic~~ anaerobic ~~acetogenic bacteria and~~ at least one gas selected from the group consisting of (1) carbon monoxide, (2) carbon dioxide and hydrogen, (3) carbon monoxide, carbon dioxide, and hydrogen, and (4) carbon monoxide and hydrogen, in the presence of an aqueous stream comprising a nutrient mixture with an anaerobic acetogenic bacteria, thereby producing a fermentation broth comprising acetic acid ~~and dissolved carbon dioxide~~;

(b) ~~removing said carbon dioxide from the fermentation broth prior to extraction;~~

(~~c~~) contacting said broth (~~b~~) with a solvent comprising an amine for a time sufficient to cause the formation of a solvent phase containing acetic acid, said solvent and water and an aqueous phase; ~~and~~

(c~~d~~) continuously distilling acetic acid from said solvent phase; and

(d) recycling said solvent to said contacting step (b).

2(Original). The process according to claim 1, wherein said fermentation broth further comprises dissolved hydrogen sulfide and said process further comprises the step of removing said hydrogen sulfide from said fermentation broth prior to extraction.

3(Currently Amended). The process according to claim ~~1~~ 2, wherein said removing step comprises contacting said fermentation broth with a gas which does not contain carbon dioxide, oxygen or hydrogen sulfide.

4(Currently Amended). The process according to claim 3 wherein said gas is selected from the group consisting of nitrogen, methane, helium, carbon monoxide, ~~carbon monoxide,~~ argon, hydrogen, a non-reactive gas, and ~~or~~ a mixture thereof.

5(Original). The process according to claim 3, wherein said removing step occurs in a countercurrent stripper column.

6(Currently Amended). The process according to claim ~~1~~ 2, wherein said removing step comprises reducing the pressure on said fermentation broth in a container separate from said ~~fermenter~~ bioreactor.

7(Currently Amended). The process according to claim 1 further comprising separating said bacteria from other components in said broth to provide a substantially cell-free stream ~~prior to said removing step~~.

8(Currently Amended). The process according to claim ~~7~~ 2, wherein said removing step comprises heating said cell-free stream to about 80°C in a container separate from said ~~fermenter~~ bioreactor.

9(Currently Amended). The process according to claim 1, wherein said solvent comprises

(i) a water immiscible solvent comprising greater than 50% by volume of a mixture of isomers of highly ~~branced~~ branched di-alkyl amines, and from about 0.01% to 20% by volume of mono-alkyl amines, said solvent having a coefficient of ~~ditribution~~ distribution greater than 10; and

(ii) at least 10% by volume of a non-alcohol co-solvent having a boiling point lower than the boiling point of said solvent (i),

wherein said mixture extracts acetic acid from aqueous streams.

10(Original). The process according to claim 9, wherein said distilling step occurs at a temperature less than about 160°C, without substantially degrading said amine to an amide, thus enhancing the efficiency of production of acetic acid.

11(Currently Amended). The process according to claim ~~1~~ 7, further comprising recycling said ~~solvent and said~~ separated bacteria into said ~~fermenter~~ bioreactor.

12(Currently Amended). The process according to claim 1, wherein said anaerobic bacteria is selected from the group consisting of *Acetobacterium kivui, A. woodii, Butyribacterium methylotrophicum, Clostridium aceticum, C. acetobutylicum, C. ~~formoaceticum~~ formicaceticum, C. kluyveri, C. thermoaceticum, C. thermocellum, C. thermohydrosulfuricum, C. thermosaccharolyticum, Eubacterium limosum, Peptostreptococcus productus,* ~~and~~ *C. ljungdahlii*, and mixtures thereof.

13(Currently Amended). The process according to claim 12, wherein said *C. ljungdahlii* is selected from the group consisting of: PETC ATCC 49587, O-52 ATCC 55989, ERI2 ATCC 55380, ~~and~~ C-01 ATCC 55988, and mixtures thereof.

14(Original). The process according to claim 1, wherein said contact with solvent occurs in a countercurrent column.

Claims 15-23. (Canceled)

24(New). The process according to claim 1, wherein said fermentation broth further comprises dissolved carbon dioxide and said process further comprises the step of removing said carbon dioxide from said fermentation broth prior to extraction.

25(New) The process according to claim 1, wherein said solvent comprises:

(i) a water immiscible solvent comprising greater than 50% by volume of a mixture of isomers of highly branched di-alkyl amines, and from about 0.01% to 20% by volume of mono-alkyl amines, said solvent having a coefficient of distribution greater than 10; and

(ii) at least 10% by volume of a linear hydrocarbon co-solvent having a boiling point lower than the boiling point of said solvent (i),

wherein said mixture extracts acetic acid from aqueous streams.

26(New). The process according to any of claims 1 or 2, wherein said bacteria is *Clostridium*.

27(New). The process according to claim 1, wherein said aqueous phase is recycled to said bioreactor.

28(New). An anaerobic microbial fermentation process for the production of acetic acid, said process comprising the steps of:

(a) fermenting in a bioreactor a gas comprising carbon monoxide, carbon dioxide, and hydrogen in the presence of an aqueous stream comprising a nutrient mixture with a *Clostridium* bacteria, thereby producing a fermentation broth comprising acetic acid;

(b) contacting said broth with a solvent comprising an amine for a time sufficient to cause the formation of a solvent phase containing acetic acid, said solvent and water;

(c) continuously distilling acetic acid from said solvent phase; and

(d) recycling said solvent to said contacting step (b).